

**WHAT IS CLAIMED IS:**

- 1                   1.       A system for detecting faults in an optical network, comprising:  
2                   a first node and a second node; and  
3                   an amplifier node coupled between the first node and the second node, the  
4                   amplifier node configured to detect a fault on an optical link connecting the amplifier node  
5                   and the first node and generate a fault report upon detection of the fault, the amplifier node is  
6                   further configured to forward the fault report to the second node.
- 1                   2.       The system according to claim 1 wherein upon receiving the fault  
2                   report from the amplifier node, if the second node is capable of switching traffic, the second  
3                   node initiates a switching action to restore traffic between the first node and the second node;  
4                   and if the second node is not capable of switching traffic, the second node forwards the fault  
5                   report to a third node.
- 1                   3.       The system according to claim 2 wherein the fault report is forwarded  
2                   until the fault report is received by a node which is capable of switching traffic.
- 1                   4.       The system according to claim 1 wherein the second node is capable of  
2                   switching traffic and is configured to:  
3                   detect a fault on an optical link carrying optical signals into the second node;  
4                   and  
5                   upon receipt of the fault report from the amplifier node, prioritize the fault  
6                   report and the fault detected by the second node.
- 1                   5.       The system according to claim 1 wherein the amplifier node is further  
2                   configured to receive and pass a fault report from another amplifier node to the second node.
- 1                   6.       The system according to claim 1 wherein the amplifier node is  
2                   configured to:  
3                   receive a fault report from another amplifier node;  
4                   prioritize the received fault report and the generated fault report; and  
5                   forward whichever fault report that has a higher priority to the second node.
- 1                   7.       The system according to claim 1 wherein the optical network is a bi-  
2                   directional line switched ring network.

1           8.     The system according to claim 1 wherein the fault on the optical link is  
2 detected based on a loss-of-signal condition.

1           9.     The system according to claim 8 wherein the amplifier node  
2 comprises:  
3                 an input signal power detector configured to monitor input power of the  
4 optical link; and  
5                 control logic configured to evaluate output from the input signal power  
6 detector to determine if the loss-of-signal condition exists.

1           10.    A method for detecting faults in an optical network having an amplifier  
2 node coupled between a first node and a second node, comprising:  
3                 detecting a loss-of-signal condition on an optical link carrying optical signals  
4 from the first node to the amplifier node;  
5                 causing the amplifier node to generate a fault report reporting occurrence of  
6 the loss-of-signal condition; and  
7                 forwarding the fault report to the second node.

1           11.    The method of claim 10 further comprising:  
2                 if the second node is capable of switching traffic, causing the second node to  
3 initiate a switching action to restore traffic between the first node and the second node; and  
4                 if the second node is not capable of switching traffic, forwarding the fault  
5 report from the second node to another node.

1           12.    The method of claim 11 further comprising:  
2                 forwarding the fault report until the fault report is received by a node which is  
3 capable of switching traffic.

1           13.    The method of claim 10 further comprising:  
2                 if the second node is capable of switching traffic, detecting a fault on an  
3 optical link carrying optical signals into the second node; and upon receipt of the fault report  
4 from the amplifier node, prioritizing the fault report and the fault detected by the second  
5 node.

1           14.    The method of claim 10 further comprising:

2 causing the amplifier node to receive and pass a fault report from another  
3 amplifier node to the second node.

1 15. The method of claim 10 further comprising:  
2 causing the amplifier node to receive a fault report from another amplifier  
3 node;  
4 prioritizing the received fault report and the generated fault report; and  
5 forwarding whichever fault report that has a higher priority to the second  
6 node.

1 16. The method of claim 10 wherein the optical network is a bi-directional  
2 line switched ring network.

1 17. An optical network comprising:  
2 a plurality of switching nodes connected to one another, at least one switching  
3 node capable of switching traffic; and  
4 a plurality of amplifier nodes;  
5 wherein:  
6 at least one amplifier node is coupled between selective pairs of  
7 switching nodes; and  
8 the least one amplifier node is configured to detect a fault on an  
9 incoming optical link carrying optical signals into that amplifier node, generate a fault report  
10 upon detection of the fault, and forward the fault report to a neighboring node.

1 18. The optical network of claim 17 wherein:  
2 upon receiving the fault report, if the neighboring node is a switching node,  
3 the neighboring node initiates a switching action to restore traffic; and if the neighboring  
4 node is not a switching node, the neighboring node forwards the fault report to another node.

1 19. The optical network of claim 18 wherein the fault report is forwarded  
2 until the fault report is received by a switching node.

1 20. The optical network of claim 17 wherein the at least one switching  
2 node is configured to:  
3 detect a fault on an incoming optical link carrying optical signals into that  
4 switching node; and

5 upon receipt of a fault report from an amplifier node, prioritize the received  
6 fault report and the fault detected by that switching node.

1 21. The optical network of claim 17 wherein the at least one amplifier  
2 node is further configured to receive and pass a fault report from another amplifier node to a  
3 switching node.

1 22. The optical network of claim 17 wherein the at least one amplifier  
2 node is configured to:  
3 receive a fault report from another amplifier node;  
4 prioritize the received fault report and the generated fault report; and  
5 forward whichever fault report that has a higher priority to the neighboring  
6 node.

1 23. The optical network of claim 17 wherein the optical network is a bi-  
2 directional line switched ring network.

1 24. The optical network of claim 17 wherein the fault on the incoming  
2 optical link is detected based on a loss-of-signal condition.

1 25. The optical network of claim 24 wherein the at least one amplifier  
2 node comprises:  
3 an input signal power detector configured to monitor input power of the  
4 incoming optical link; and  
5 control logic configured to evaluate output from the input signal power  
6 detector to determine if the loss-of-signal condition exists.

1 26. An amplifier node for use in an optical network, comprising:  
2 an input signal power detector configured to monitor input power of an  
3 incoming optical link received by the amplifier node; and  
4 control logic configured to:  
5 evaluate output from the signal power detector to determine if a loss-  
6 of-signal condition thereby indicating a fault on the incoming optical link; and  
7 generate a fault report reporting the loss-of-signal condition.

1                   27.    The amplifier node of claim 26 wherein the control logic is further  
2 configured to forward the fault report to a switching node to allow the switching node to  
3 initiate a switching action.

1                   28.    The amplifier node of claim 26 wherein the control logic is further  
2 configured to:  
3                   receive a fault report from another amplifier node;  
4                   prioritize the received fault report and its own generated fault report; and  
5                   forward whichever fault report that has a higher priority to a switching node.

1                   29.    The amplifier node of claim 26 wherein the optical network is a bi-  
2 directional line switched ring network.